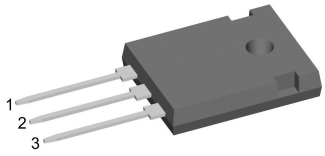
# Standard Rectifier

| | | |
|---|---|---|
| $V_{RRM}$ | = | 2x 1600 V |
| $I_{FAV}$ | = | 50 A |
| $V_F$ | = | 1.26 V |

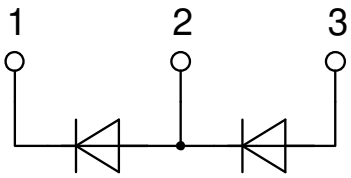
## Phase leg

**Part number**

**DMA50P1600HB**




Backside: anode/cathode




**Features / Advantages:**

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour
- High commutation robustness
- High surge capability

**Applications:**

- Diode for main rectification
- For single and three phase bridge configurations

**Package:** TO-247

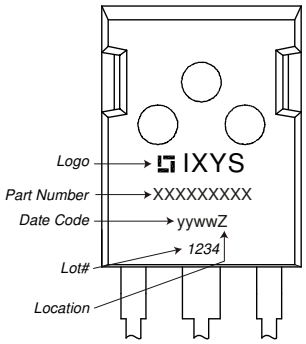
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

## Rectifier

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1700 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1600 | V |
| $I_R$ | *reverse current* | $V_R$ = 1600 V | $T_{VJ}$ = 25°C | | | 40 | µA |
| | | $V_R$ = 1600 V | $T_{VJ}$ = 150°C | | | 1.5 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 50 A | $T_{VJ}$ = 25°C | | | 1.30 | V |
| | | $I_F$ = 100 A | | | | 1.61 | V |
| | | $I_F$ = 50 A | $T_{VJ}$ = 150°C | | | 1.26 | V |
| | | $I_F$ = 100 A | | | | 1.66 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 130°C<br>180° sine | $T_{VJ}$ = 175°C | | | 50 | A |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0.81 | V |
| $r_F$ | *slope resistance* } | | | | | 8.6 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 0.45 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.3 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 330 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 650 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 700 | A |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 555 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 595 | A |
| $I^2t$ | *value for fusing* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 2.12 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 2.04 | kA²s |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 1.54 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 1.48 | kA²s |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V; f = 1 MHz | $T_{VJ}$ = 25°C | | 19 | | pF |

| Package TO-247 | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal | | | 70 | A |
| $T_{VJ}$ | *virtual junction temperature* | | -55 | | 175 | °C |
| $T_{op}$ | *operation temperature* | | -55 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -55 | | 150 | °C |
| **Weight** | | | | 6 | | g |
| $M_D$ | *mounting torque* | | 0.8 | | 1.2 | Nm |
| $F_C$ | *mounting force with clip* | | 20 | | 120 | N |

Product Marking




**Part description**

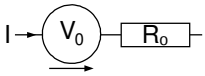
D = Diode
M = Standard Rectifier
A = (up to 1800V)
50 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
HB = TO-247AD (3)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DMA50P1600HB | DMA50P1600HB | Tube | 30 | 522301 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DMA50P1200HB | TO-247AD (3) | 1200 |

## Equivalent Circuits for Simulation

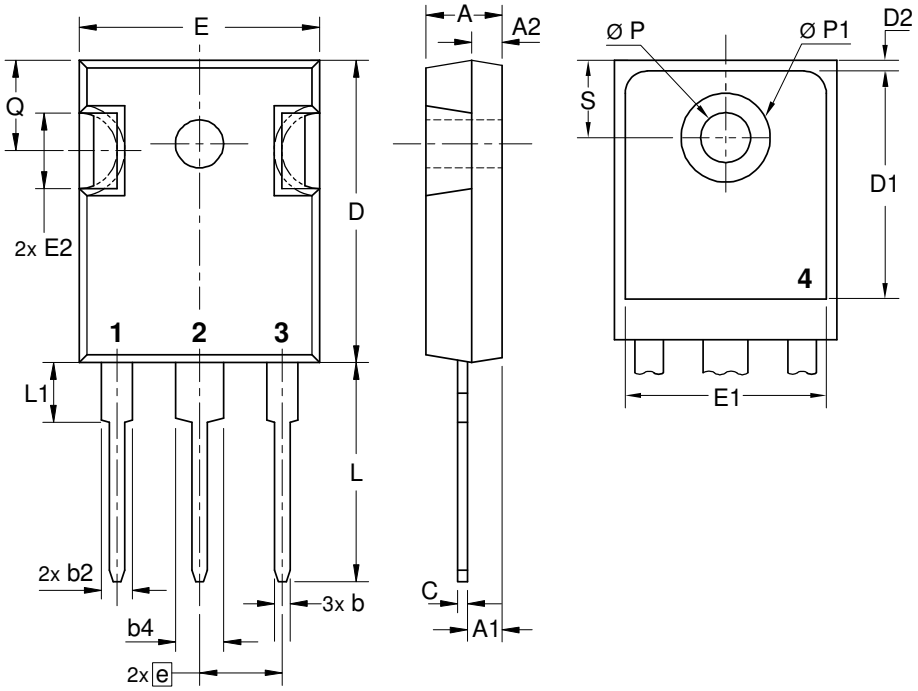
** on die level* $T_{VJ} = 175°C$



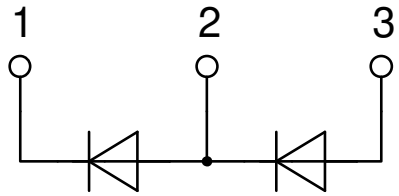

**Rectifier**

| | | | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.81 | V |
| $R_{0\,max}$ | *slope resistance ** | 6 | mΩ |

## Outlines TO-247




| Sym. | Inches | | Millimeter | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 0.185 | 0.209 | 4.70 | 5.30 |
| A1 | 0.087 | 0.102 | 2.21 | 2.59 |
| A2 | 0.059 | 0.098 | 1.50 | 2.49 |
| D | 0.819 | 0.845 | 20.79 | 21.45 |
| E | 0.610 | 0.640 | 15.48 | 16.24 |
| E2 | 0.170 | 0.216 | 4.31 | 5.48 |
| e | 0.215 BSC | | 5.46 BSC | |
| L | 0.780 | 0.800 | 19.80 | 20.30 |
| L1 | - | 0.177 | - | 4.49 |
| Ø P | 0.140 | 0.144 | 3.55 | 3.65 |
| Q | 0.212 | 0.244 | 5.38 | 6.19 |
| S | 0.242 BSC | | 6.14 BSC | |
| b | 0.039 | 0.055 | 0.99 | 1.40 |
| b2 | 0.065 | 0.094 | 1.65 | 2.39 |
| b4 | 0.102 | 0.135 | 2.59 | 3.43 |
| c | 0.015 | 0.035 | 0.38 | 0.89 |
| D1 | 0.515 | - | 13.07 | - |
| D2 | 0.020 | 0.053 | 0.51 | 1.35 |
| E1 | 0.530 | - | 13.45 | - |
| Ø P1 | - | 0.29 | - | 7.39 |



## Rectifier

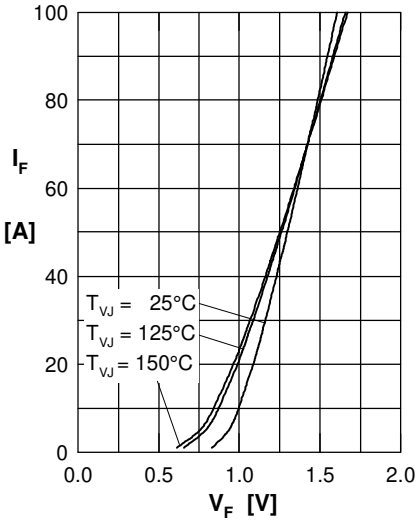



Fig. 1 Forward current versus voltage drop per diode

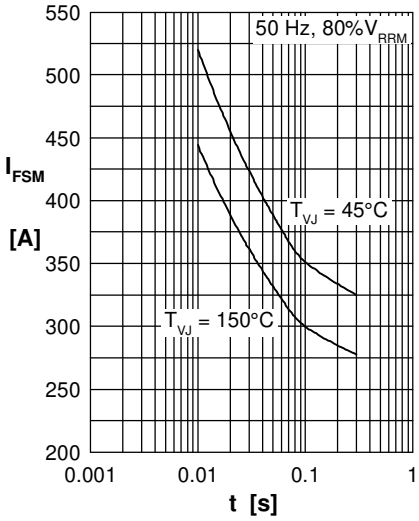



Fig. 2 Surge overload current versus time per diode

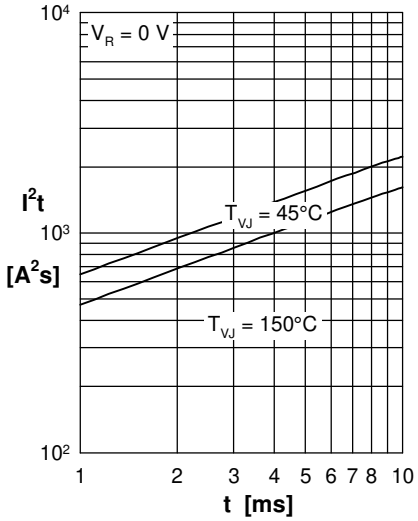



Fig. 3 $I^2t$ versus time per diode

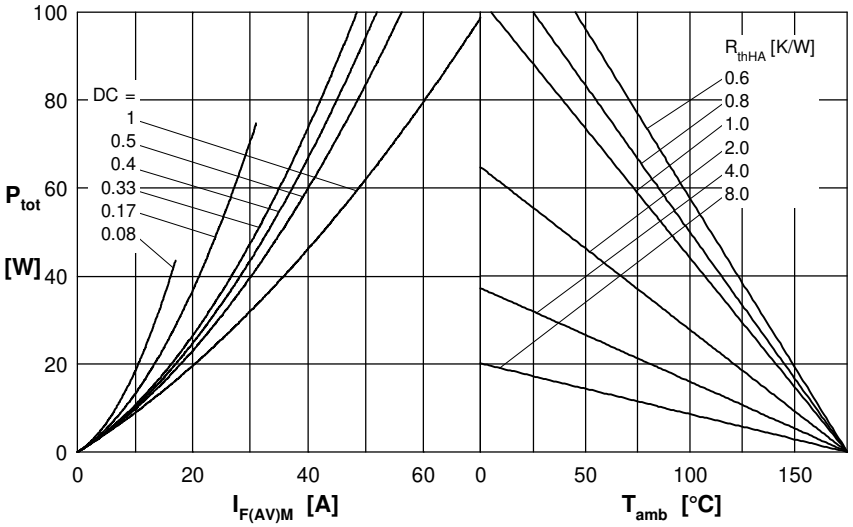



Fig. 4 Power dissipation versusdirect output current and ambient temperature per diode

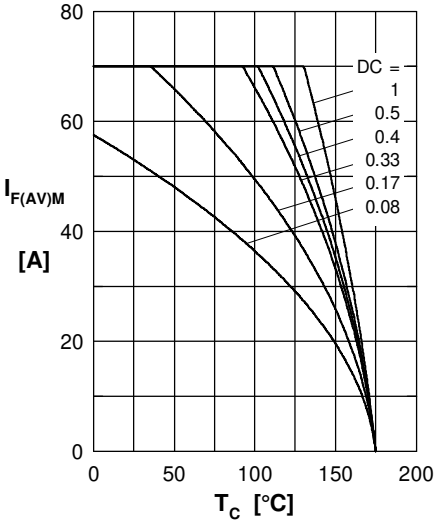



Fig. 5 Max. forward current versus case temperature per diode

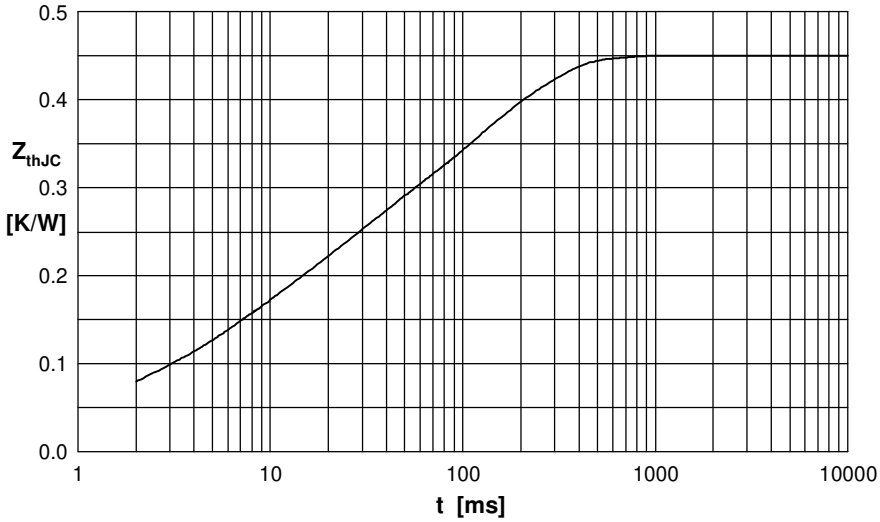



Fig. 6 Transient thermal impedance junction to case versus time per diode

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.033 | 0.0006 |
| 2 | 0.075 | 0.0038 |
| 3 | 0.124 | 0.0170 |
| 4 | 0.218 | 0.1400 |